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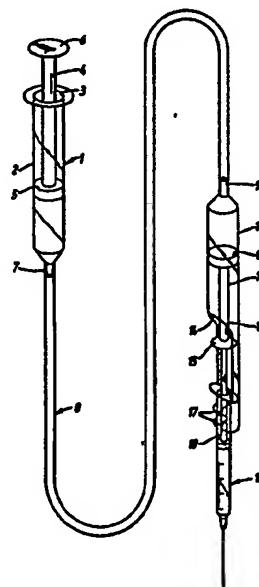
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④ Adaptor for injection syringe.

⑤ Two handed control of the injection of for example insulin is made possible by use of a remote drive adaptor for an injection syringe which comprises hand held drive means (1) connected to a usually disposable injection syringe (16) via a hydraulic/mechanical linkage comprising a piston (4) in a housing (2) displacing fluid through tubing (8) to a plunger (11) for mechanically actuating the syringe (16) which is held by the patient at the location of injection.



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ADAPTOR FOR INJECTION SYRINGE

This invention relates to an adaptor for an injection (or hypodermic) syringe for use in particular, but not exclusively, in the injection of insulin from a simple syringe which may be a disposable syringe.

Insulin has been used in the control of diabetes mellitus for many years, especially insofar as the use of bovine insulin is concerned. Currently, there are about 100 million people in the world suffering from diabetes and needing to carry out self medication with insulin preparations. The cost of insulin for use in self medication has become much reduced so that it is rarely a problem insofar as the treatment of patients is concerned. The main problem is that insulin can only be administered by injection and this must be done daily. Another problem arises in respect of the area in which injection is to take place. This should be as large as possible in order to decrease the possibility of rejection and of local side effects of insulin. It is common practice for the patient to be taught to inject himself subcutaneously either in the abdomen or on the front of the thigh. Intramuscular and intravenous injection is also possible, but generally considered to be less suitable for self administration. Many instruments have been invented to help patients inject themselves subcutaneously. These instruments may be of different types and involve injection in different ways. However they all share the same problem of difficulty of control, as well as requiring maintenance and sterilisation. There is a high percentage of failures and the possibility of injecting too large a dose with such instruments, which might be fatal.

It is generally considered that most patients prefer to use simple syringes in carrying out the injection and the use of such syringes has until now been considered to be the safest, cheapest and easiest way of administering insulin. Simple disposable syringes may

1 indeed be used but with these as with injection syringes  
in general there is the difficulty that controlled  
administration of insulin can only take place in limited  
areas of the body such as the abdomen or thigh as already  
5 mentioned.

It is an object of the present invention to  
provide a means for enabling self administration of an  
injection fluid to be effected by a patient at a wide  
variety of locations on the body with there being a high  
10 degree of control of the instrument during  
administration.

According to the present invention, there is  
provided a remote drive adaptor for an injection syringe  
which comprises hand held drive means comprising a piston  
15 cylinder, whose piston is drivable by hand and on the  
downward side of which there is a fluid chamber; a  
plunger housing and flexible duct means connecting the  
fluid chamber of the piston cylinder with the plunger  
housing for supplying fluid from the piston cylinder to  
20 the upper surface of a plunger housed in the plunger  
housing to act thereon, the plunger housing being adapted  
for attachment to an injection syringe, with said plunger  
projecting from its housing to act on the piston rod of  
the injection syringe to enable its fluid powered motion  
25 to be imparted thereto.

This invention provides a simple device for self  
use by the patient, enabling the use of a simple syringe  
as used routinely for injection of insulin but with  
displacement of the point of application of force by the  
30 patient to the piston cylinder of the drive means which  
acts as a pump providing a hydraulic linkage so that it  
is fluid power from the pump which is the agent in  
driving the syringe for injection of insulin.

For a better understanding of the invention, and  
35 to show how the same can be carried into effect,  
reference will now be made by way of example only to the  
accompanying drawing which shows schematically an adaptor

- 1 according to the present invention in engagement with a  
syringe for injection of insulin.

Referring to the drawing, there is shown a pump 1 comprising a piston cylinder 2 having an open end 3 through which is inserted a piston 4 whose head 5 is of smaller diameter than the opening 3 and which provides a good seal against the wall of the piston cylinder. The piston carries a handpiece 6 which can be depressed by hand to impart downward displacement to the piston. The lower part of the piston cylinder 2 tapers to a neck 7 which enters a tube 8 of flexible plastics material whose other end fits over a neck 9 on a plunger housing 10. The plunger housing contains a plunger 11 having a head 12 which is in sealing engagement with the wall of the plunger housing 10 and is attached to a rod 13 which extends out of an opening 14 in the housing to engage the head 15 of the piston of a conventional syringe 16 for injection of insulin. The housing 10 is elongated to form two wings 17 which grip the housing 18 of the insulin syringe.

The adaptor is used in the following manner. The flexible tube 8 is connected up at one end to the piston cylinder and at the other end to the plunger housing 10. The plunger 11 is pushed up the plunger housing until it is adjacent the position of connection with the tube 8. With the piston 4 absent from the piston cylinder 2, fluid such as water is introduced into the piston cylinder 2 and allowed to pass through the tube 8 to extend as far as the plunger 11. The level of fluid in the piston cylinder 2 should be such as to provide a quantity of fluid largely equal to the space within the plunger housing 10 below the plunger. With the piston 4 replaced in its housing, the adaptor is ready for use.

A conventional syringe filled with an injectable fluid which in the preferred case will be an insulin preparation is then attached to the adaptor. The wings 17 of the housing 10 are sufficiently flexible to allow

1 them to wrap around and grip the housing 18 of the  
insulin syringe. The location at which the housing 16 is  
gripped is such that the top of the head 13 of the  
syringe will lie immediately below the plunger 11.  
5 Indeed the base of the plunger may be shaped as shown to  
engage the head 15. Then, with the housing 16 of the  
syringe held in the one hand, which will be assumed  
hereinafter to be the right hand of a right handed  
patient, and the piston cylinder 2 held in the other, the  
10 needle is injected into the body at a suitable location  
for injection of the insulin. The right-handed person  
who has been holding the syringe housing 18 in his right  
hand will have full control of the syringe at this stage.  
While the patient is still holding the syringe in the  
15 right hand, he then depressed the head 5 of the piston 4  
with the left hand and causes the fluid in that piston  
cylinder 2 to be displaced to act on the plunger 11 to  
displace it downwardly and in turn act on the handpiece  
13 whose depression causes operation of the syringe and  
20 injection into the body of insulin.

Throughout the aforesaid operation, the syringe is  
being held steady in the right hand of the patient so  
that there is no movement of the syringe during  
introduction of insulin to the body. There will be no  
25 shifting of the needle which is a particular problem when  
the diabetic patient does not have a steady hand because  
of neuropathy. Moreover, no longer is it necessary for  
the patient to be restricted to injecting himself in  
areas of the body which he can see particularly well to  
30 ensure steady injection of the syringe needle and  
reliable holding of the needle in the body during the  
injection of the insulin. Provided that the patient can  
in the first instance manage to introduce the needle with  
his stronger hand, it does not matter that subsequently  
35 it would not be convenient for him to attempt to depress  
directly the piston of the syringe. The pump 1 will be  
at any convenient location and an orientation selected

- 1 which will allow easy depression of the piston 4 with the  
left hand. Thus it will be possible for injection to  
take place in the deltoid region, the left upper arm of a  
right-handed patient or various other locations which are  
5 generally more suitable locations for introduction of the  
insulin than the front of the thigh or the abdomen  
allowing, in particular intravenous or intramuscular  
injection to take place.

Indeed, by graduating the piston cylinder 2 in a  
10 manner matched to graduations on the housing 18 of the  
insulin syringe, merely by observing the depression of  
the piston 4 within its housing, it will be possible to  
see how much insulin is being administered to the body.

Clinical tests utilising the adaptor of the  
15 invention have already yielded satisfactory results. The  
adaptor of the invention is capable of use any number of  
times although it is desirable for it to be sterilised  
before reuse. After a while, too, seals are likely to  
deteriorate. For health reasons, therefore, although  
20 making the adaptor more costly, it should be disposable  
and utilised likewise with disposable syringes. Thus all  
parts of the adaptor can be made of plastics material.  
The adaptor can be utilised many times until its flexible  
tubing becomes hard or there is a tendency to leak.  
25 Tests have shown that it may be reliable for use at least  
ten times and thus a convenient pack to supply to a  
patient might comprise ten disposable syringes with a  
single disposable adaptor of this invention.

1 Claims:

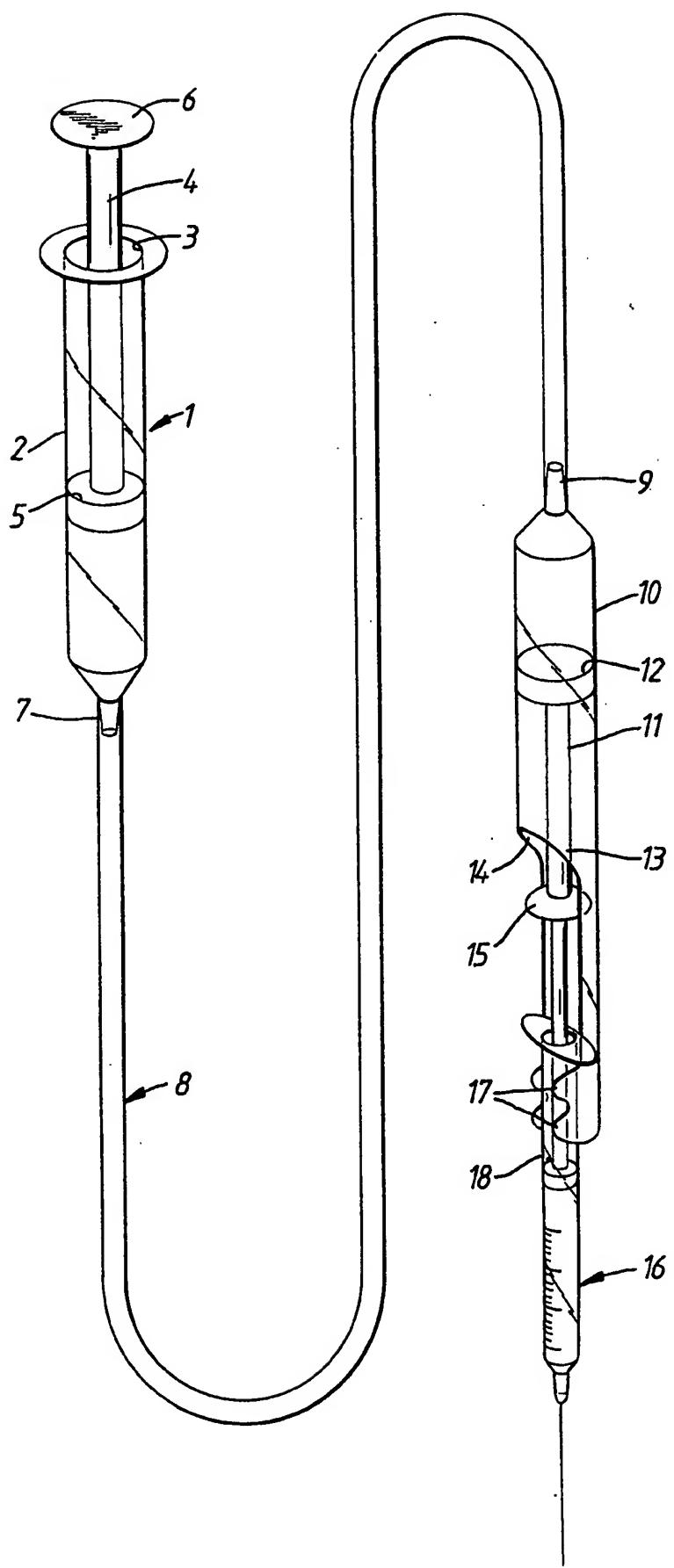
1. A remote drive adaptor for an injection syringe which is characterised by hand held drive means (1) comprising a piston cylinder (2), whose piston (4) is  
5 drivable by hand and on the downward side tof which there is a fluid chamber; a plunger housing (10) and flexible duct means (8) connecting the fluid chamber of the piston cylinder (2) with the plunger housing (10) for supplying fluid from the piston cylinder to the head (12) of a  
10 plunger (11) housed in the plunger housing to act thereon, the plunger housing (10) being adapted to engage the piston rod (15) of an injection syringe (16), with said plunger projecting from its housing to act on the piston rod to enable its fluid powered motion to be  
15 imparted thereto.

2. An adaptor according to claim 1, wherein the plunger housing (10) comprises an extension thereof formed in a terminal region with wings (17) adapted to grip an injection syringe (16) inserted therebetween.  
20 3. An adaptor as claimed in claim 2 wherein the plunger (11) extends from its housing (10) to a position intermediate the housing and the wing extension (17) and terminates externally of the housing in a portion adapted to engage the head (15) of an injection syringe.

25 4. An injection kit for self-administration of insulin to a patient which comprises an adaptor as claimed in any preceding claims and at least one syringe for use therewith, the piston cylinder (2) of the drive means (1) being transparent and graduated volumetrically  
30 to match the volumetric graduations on the syringe(s).

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DOCUMENTS CONSIDERED TO BE RELEVANT			EP 87300585.4						
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claims	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)						
A	<u>DE - C - 361 789</u> (K.HARTMANN) * Totality * --	1	A 61 M 5/31 A 61 M 5/315						
A	<u>US - A - 3 063 449</u> (A.R.P.SCHULTZ) * Totality * --	1							
A	<u>GB - A - 180 753</u> (T.C.HERBER) * Totality * -----	1							
TECHNICAL FIELDS SEARCHED (Int. Cl 4)									
A 61 M 5/00									
<p>The present search report has been drawn up for all claims</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">Place of search</td> <td style="width: 33%;">Date of completion of the search</td> <td style="width: 34%;">Examiner</td> </tr> <tr> <td>VIENNA</td> <td>14-05-1987</td> <td>LUDWIG</td> </tr> </table>				Place of search	Date of completion of the search	Examiner	VIENNA	14-05-1987	LUDWIG
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<b>CATEGORY OF CITED DOCUMENTS</b>									
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document									
T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document									